

## Letter from Alexander Graham Bell to Mabel Hubbard Bell, May 1, 1917

Beinn Bhreagh, near Baddeck Nova Scotia. 1917 May 1 Mrs Alexander Graham Bell 1331 Connecticut Avenue Washington D C Dear Mabel:—

Just received your note of Apl 26th.

It seems to me I have an awfully pessimistic crowd in my family so far as the War is concerned. To me every thing seems most promising for the Allies — but its a long long way to Tipperrary.

On Friday (Apl 27) we started towing experiments with the Gauldrie. We have taken possession of the old gig from the warehouse and are using it fortowing experiments as a starter so as to get some idea as to the way the resistance curve goes up with boats of ordinary construction. We have not yet settled down to regular experiments for a great deal of time has to be spent in fussing over preliminary work to get the conditions just right.

First we have had to change our course in BB Harbour a little so as to allow room for the Gauldrie to get straightened out at the turn. Then we found that the Gig had a tendency to yaw from side to side which affected the pull. We have now remedied this by putting a man on board to steer. But this morning we had to stop in the midst of our experiment because the Gauldrie engine broke down. The steering is a great improvement but the man steered with an oar. We must now provide a rudder for the gig.

My plan is to make a large number of experiments with the gig just as she is, with a man on board, and with pig lead to bring her total weight up to just one thousand pounds.

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The time for small experiments has passed and all the apparatus we use now will weigh one thousand pounds.

I have gone over all my old note books and am now devoting special attention to the successful experiments of the past.

While we are getting the resistance curve of the gig which will give us a standard for comparison with ordinary boats the Laboratory staff will make special apparatus. 2 for me. The men are so busily engaged on Government work that I do not like to occupy any of their time excepting to make apparatus that has been carefully thought out. I have not therefore given any instructions for the building of the machine with curved hydro-surfaces as yet.

I find that John MacDermid, who is looking after me well in the house boat, and has just come up to the office to make me take my daily exercise, can help me a great deal on experiments that I do not care to use the Laboratory staff on. He rigged me up in fine style for my candle experiments; and I am going to ask him to make another apparatus for me that may or may not have a bearing on hunting submarines under the water instead of on it. Some how or other we all seem to assume that nothing can be seen under water and yet we know that divers carry on wrecking operations under a searchlight. We know that in an aquarium we can see every thing going in the tank by the daylight admitted from above. We know then that we can see a light under water; but how far off we can see it is a question that has not been solved. On a dark night you can see the light of a candle easily at a distance of a mile. At night we have no difficulty in seeing the stars but in the daytime we cannot see them.

Briefly I propose to rig up an electric light at the Lab wharf in a dark box and throw the light down into the water on a submerged mirror set at an angle of 45°. The light should then be projected horizontally under the water of the Bay. Then I will take a boat and bring it

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near the Lab wharf and examine the light through a water glass with a mirror at the bottom arranged at 45°.

Of course there will be no difficulty in seeing the light at a distance of twenty or thirty feet. Then we will row gradually out into the Bay to ascertain how far off we can go without the light. I should not be surprised to find that we can detect it at the other side of the Bay a mile or more away.

Your loving Alec